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2 **IN THE UNITED STATES DISTRICT COURT**
3 **FOR THE EASTERN DISTRICT OF TEXAS**
4 **TYLER DIVISION**

5 LONE STAR TECHNOLOGICAL
6 INNOVATIONS, LLC,

7 Plaintiff,

8 v.

9 ASUSTeK COMPUTER INC.,

10 Defendant.

Case No. 6:19-CV-00059-RWS

11 LONE STAR TECHNOLOGICAL
12 INNOVATIONS, LLC,

13 Plaintiff,

14 v.

15 Barco N.V.,

16 Defendant.

Case No. 6:19-CV-00060-RWS

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20 **DECLARATION OF ROBERT STEVENSON, PH.D.**
21 **IN SUPPORT OF BARCO N.V.'s**
22 **INITIAL CLAIM CONSTRUCTIONS**
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I, Robert Stevenson, declare as follows:

1. I have been retained by Complainant Barco N.V. (“Barco”) to provide expert opinion and testimony in connection with the above captioned Investigation. In particular, I have been asked by Barco to provide expert opinions with regard to the construction of certain claim terms of U.S. Patent Nos. 6,724,435 (“the ’435 patent”). The expert opinions that I set forth in my declaration are based upon my knowledge in the field, the patents at issue in this Investigation, the file history of the patent at issue in this matter. I am being compensated at a rate of \$600 per hour. My compensation is in no way dependent upon or contingent upon the opinions and testimony that I render during the course of this Investigation.

I. BACKGROUND AND QUALIFICATIONS

2. I have a Bachelor’s degree in Electrical Engineering from the University of Delaware and a Ph.D. degree in Electrical Engineering from Purdue University. My Ph.D. research was on communications and signal processing.

3. I am presently a Professor in the Department of Electrical Engineering at the University of Notre Dame. I first joined the faculty at the University of Notre Dame as an Assistant Professor in the Department of Electrical Engineering in 1990. I was granted tenure and promoted to the rank of Associate Professor in August 1996. I attained the rank of Professor in the Department of Electrical Engineering in August 2002, and I continue to serve in that capacity. I also served concurrently as a Professor in the Department of Computer Science and Engineering at the University of Notre Dame from January 2003 through June 2017.

4. Since 2013 I have served as an Associate Chair of the Department of Electrical Engineering. I also serve as the Director of Undergraduate Studies in Electrical Engineering. In this role I oversee the department’s undergraduate program in Electrical Engineering.

5. I spent the summer of 1992 at the Air Force Research Lab in Rome, New York and I spent the summer of 1993 at the Intel[®] Corporation in Hillsboro, Oregon. Several leading computing companies, including Intel[®], Sun Microsystems[®], Apple[®] Computer, and Microsoft[®], have supported my research at Notre Dame. During the past 30 years, I have published over 150 technical papers related to the field of image processing and digital systems.

6. I am a member of the Institute of Electronics and Electrical Engineers, The International Society for Optical Engineering, and the Society for Imaging Science and Technology. I am a member of the academic honor societies Eta Kappa Nu, Tau Beta Pi, and Phi Kappa Phi.

7. For the past 30 years my work has focused on the design of techniques, hardware, and software for the processing of digital signals using digital computing devices. As an academic researcher I attempt to develop novel ideas for systems, then publish and present those ideas to the technical community. My success as an academic is directly related to the insights and techniques that provide the basis for new generations of products. My early work on digital techniques for printing and image capture devices led to significant interaction with companies developing desktop computers products in the early 1990's as they tried to incorporate those ideas into their products.

8. My interaction with Apple's Imaging Group focused on various imaging devices such as digital cameras, scanners, and printers and how to best support those devices on desktop computers. At Intel, I worked in Intel's Architecture Lab at the time the MMX multimedia instructions were being incorporated into the Pentium processor. My work there dealt with developing video compression techniques for CD-ROMs and network communications that were well matched to the Pentium architecture. I also gave a series of talks on how advanced communication and video processing techniques could be better supported on the Pentium platform. Similarly, my interaction with Sun Microsystem's group examined how advanced signal processing

techniques could be best implemented using Sun's new Visual Instruction Set on the Sparc architecture.

9. I have also received significant support for my research from several U.S. Department of Defense agencies. The Air Force Research Laboratory has funded my work to develop advanced parallel processing algorithms that exploited an ad-hoc network of mixed computers to achieve significant computational advantages over their previously implemented techniques. Other Department of Defense agencies have supported my work in image and video enhancement.

10. I have taught classes at Notre Dame for 28 years. Over time I have taught courses in basic electronic circuit analysis and design, digital signal processing, image processing, computer vision, and random processes. Recently, I developed a new course at Notre Dame in multimedia signals and systems, which is the design of electronic circuits for the capture, processing and display of acoustic and imaging signals. In this course I cover many topics related to digital video systems including concepts of color, its modification and its characterization using attributes such as hue and saturation.

11. Additional information concerning my background, qualifications, publications, conferences, honors, and awards are described in my Curriculum Vitae, a copy of which is attached with this Report as Exhibit A.

12. A listing of previous cases in which I have provided expert testimony in the past four years can also be found in Exhibit B.

13. In forming my opinions described in this report, I considered and relied upon the '435 patent and its corresponding prosecution file history, as well as the parties' proposed constructions of terms relating to those patents.

II. SUMMARY OF OPINIONS

As set forth below, it is my opinion that the disputed terms have the following meanings

Claim Term	Construction
“Characterizing”	Indefinite
“Individual color”	“a linear combination of colors or color components”
“Input image pixel”	“image data including an integer row, an integer column, and color component values for each of red, green, and blue”
“Forming a corresponding plurality of output image pixels having said selected individual color”	“Forming a plurality of output image pixels that each correspond to one of the plurality of input image pixels that have said selected individual color in the real time digital video input image with the hue or the saturation selected to be independently changed, the output image pixels having said selected individual color”
“By performing arithmetic and logical operations”	Indefinite as to whether this clause modifies “identifying”, “changed”, or both terms
“Evaluating” and “Evaluated”	Indefinite
“Viewer”	Indefinite – illustrates that method steps are performed by a human as discussed below.
All method steps, or the combination of method steps and system elements in a single claim (claim 17): <i>operating</i> said master control device . . . ; <i>selecting</i> an independent color hue control delta value or an independent color saturation control delta value . . . ; <i>identifying</i> a plurality of said input image pixels . . . ; <i>determining</i> corresponding output image pixel values . . . ; <i>displaying</i> a real time digital video output image . . .	Indefinite – A claim that “recites both a system and a method for using that system” is invalid as indefinite. <i>IPXL Holdings v. Amazon.com</i> , 430 F.3d 1377, 1384 (Fed. Cir. 2005).

III. LEGAL STANDARDS

14. I am not an attorney, but I have been informed by counsel of the following standards.

A. Claim Construction

15. I am informed by counsel that Claim construction begins with the words of the claim itself, which generally receive their ordinary and customary meaning as understood by a person of ordinary skill in the art at the time of the invention in the context of the specification and prosecution history. *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312-13 (Fed. Cir. 2005) (*en banc*). To ascertain the ordinary and customary meaning of the claims, courts consider the intrinsic record, including the claims, the specification, and the prosecution history. *Id.* at 1314. Claim terms “can be defined only in a way that comports with the instrument as a whole[]” and must be read “in the context of the entire patent[.]” *Markman v. Westview Instruments, Inc.*, 517 U.S. 370, 389 (1996). It is the claims that delimit a patentee’s right to exclude, and therefore it is not proper to import imitations from the specification into the claims. *Varco, L.P. v. Pason Sys. USA Corp.*, 436 F.3d 1368, 1373 (Fed. Cir. 2006). The “scope of a claim term often covers more than the embodiments disclosed in the specification” and a patentee “need not describe in the specification every conceivable and possible future embodiment of his invention.” *CCS Fitness, Inc. v. Brunswick Corp.*, 288 F.3d 1359, 1366 (Fed. Cir. 2002) (internal quotation marks and citation omitted). On the other hand, “a claim interpretation that excludes a preferred embodiment from the scope of the claim is rarely, if ever, correct.” *On-Line Techs., Inc. v. Bodenseewerk Perkin-Elmer GmbH*, 386 F.3d 1133, 1138 (Fed. Cir. 2004).

16. I am informed by counsel that, in addition to the specification and claims, the court may also consider the prosecution history, which, “[l]ike the specification, . . . provides evidence of how the PTO and the inventor understood the patent.” *Phillips*, 415 F.3d at 1312 (citation omitted). In addition, “[a] court can look to the prosecution history of related patents for guidance in claim construction[.]” *Aventis Pharms. Inc. v. Amino Chems. Ltd.*, 715 F.3d 1363, 1375 (Fed. Cir. 2013) (citation omitted).

17. I am informed by counsel that courts may also consider extrinsic evidence, e.g., inventor testimony, dictionaries, and treatises, when intrinsic record alone is insufficient to support proper constructions. *Phillips*, at 1317-18. Expert testimony is often helpful to illuminate complex technical issues and provide a foundation for the viewpoint of one of ordinary skill in the relevant art. *Id.* at 1318 (“We have also held that extrinsic evidence in the form of expert testimony can be useful to a court for a variety of purposes, such as to provide background on the technology at issue, to explain how an invention works, to ensure that the court’s understanding of the technical aspects of the patent is consistent with that of a person of skill in the art, or to establish that a particular term in the patent or the prior art has a particular meaning in the pertinent field.”). As the Federal Circuit explained, “[t]he construction that stays true to the claim language and most naturally aligns with the patent’s description of the invention will be, in the end, the correct construction.” *Id.* at 1316 (internal quotation marks and citation omitted).

B. Claim Indefiniteness

18. Likewise, I am informed by counsel that a patent must “conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as [the] invention.” 35 U.S.C. § 112, ¶ 2 (2006). A claim fails to satisfy this statutory requirement only if its language, when read in light of the specification and the prosecution history, “fail[s] to inform, with reasonable certainty, those skilled in the art about the scope of the invention.” *Nautilus, Inc. v. Biosig Instruments, Inc.*, 134 S. Ct. 2120, 2124 (2014). This standard allows for some amount of uncertainty, as absolute precision in claim drafting is unattainable. *Id.* at 2128-29. Instead, indefiniteness problems arise where the claim language “might mean several different things and ‘no informed and confident choice is available among the contending definitions’.” *Interval Licensing LLC v. AOL, Inc.*, 766 F.3d 1364, 1371 (2014) (citing *Nautilus*, 134 S. Ct. at 2130 & n. 8 (quoting *Every Penny Counts, Inc. v. Wells Fargo Bank, N.A.*, 2014 U.S.

Dist. LEXIS 28106, 2014 WL 869092, at *4 (M.D. Fla. Mar. 5, 2014))). Claim drafting flaws, such as lack of antecedent basis, do not automatically render claims indefinite. *See, e.g., Trover Grp., Inc. v. Dedicated Micros USA*, 2015 U.S. Dist. LEXIS 33876 at *28 (E.D. Tex. March 19, 2015) (citing *Nautilus*, 134 S. Ct. at 2124). A claim may be reasonably clear to a person of skill in the art even in the presence of drafting flaws. *Id.*

19. I am also informed by counsel that a patent claim directed to a system or apparatus must not include method steps, as this impermissibly combines statutory classes of claims. Thus, a single claim that “recites both a system and a method for using that system” is invalid as indefinite. *IPXL Holdings v. Amazon.com*, 430 F.3d 1377, 1384 (Fed. Cir. 2005).

IV. TECHNOLOGY OF THE '435 PATENT

20. The patented technology of the '435 patent generally relates to the control of an individual color. Specifically, the '435 patent purports to allow for the independent change of the hue or saturation of an individual color without affecting the hue or saturation of any other individual color.

V. LEVEL OF ORDINARY SKILL IN THE ART

21. In connection with evaluating the '435 patent at issue in my report, I have formed an opinion as to the level of skill in the art. It is my opinion that one of ordinary skill in the art of digital video systems in the early 2000's, were people with (i) at least a bachelor's degree in electrical engineering, computer science, applied mathematics, or an equivalent field, as well as at least one or two years of industry experience in digital video system design, (ii) at least five years of comparable industry experience in digital video system design, or (iii) an equivalent combination of academic study and work experience.

22. I have reached this opinion regarding the level of ordinary skill in the art based on my review of the asserted patents and my personal experience in educating, supervising, and working with persons having the level of ordinary skill in the art around the time of invention of the asserted patents.

VI. CLAIM CONSTRUCTION

A. “Characterizing”

23. The term “characterizing” is found in all asserted claims of the ‘435. In my opinion the term “characterizing” fails to inform a person of ordinary skill in the art with reasonable certainty about the scope of the claimed invention.

24. “Characterizing” is not a term with an ordinarily understood technical meaning in the field of digital video systems. As such, applicants of the ‘435 patent created this term to attempt to describe the alleged invention.

25. Additionally, the ‘435 Patent provides no guidance as to what is meant by “characterizing” as a step performed in a method. Parts of the specification discuss colors or color components as being “characterized by linear combinations of the basic colors red, green, and blue,” e.g. ‘435 Patent at 6:44-46. However, this is not characterizing a real time digital input image. With regards to characterizing a real time digital input image, the specification states only

In Step (a) of the method of the present invention, there is receiving and characterizing a real time digital video input image. Preferably, there is receiving a real time digital video input image, I, featuring colors or color components characterized by linear combinations of the basic colors red, green, and blue, in RGB color space, whereby the real time digital video input image, I, features basic colors red, green, and blue, and, complementary colors yellow, cyan, and magenta, in the RGB color space featuring a color based three-dimensional coordinate system.

‘435 Patent at 6:40-50. As described in the specification, a digital input image is a collection of

colors or color components. Those colors or color components are characterized by linear combinations of basic colors. However, this says nothing as to how the digital input image itself is “characterized” or how one might perform the step of characterizing a digital video input image.

26. Thus, the scope of “characterizing” would be unclear to a person of ordinary skill in the art and in my opinion is indefinite.

B. “Individual color”

27. The term “individual color” appears in claim 1 and claim 17 of the ‘435 patent. In my opinion, the term should be construed as “a linear combination of colors or color components.” This term is expressly defined in the ‘435 patent, col. 1:20-21.

C. “Input image pixel”

28. The term “input image pixels” appears in claim 1 and claim 17 of the ‘435 patent. In my opinion, the term should be construed as “image data including an integer row, an integer column, and color component values for each of red, green, and blue”.

29. This is confirmed in the specification, which states that each of a plurality of input image pixels of the real time digital video input image, *I*, which can be plotted in an input grid of a real time digital video image display device, whose position coordinates in the input grid are indicated by row *i*, and column *j*, and that “for each input image pixel, $I[i,j: R_{in}, G_{in}, B_{in}]$, individual basic colors or color components, red, green, and blue, have color or color component values represented by the terms *R_{in}*, *G_{in}*, and *B_{in}*, respectively.” ‘435 patent at 6:58-7:4.

D. “Forming a corresponding plurality of output image pixels having said selected individual color”

30. The term “forming a corresponding plurality of output image pixels having said selected individual color” appears in claim 1 and claim 17 of the ‘435 patent. In my opinion, the term should be construed as “forming a plurality of output image pixels that each correspond to one

of the plurality of input image pixels that have said selected individual color in the real time digital video input image with the hue or the saturation selected to be independently changed, the output image pixels having said selected individual color”.

31. This construction is supported by the specification, which states that the corresponding plurality of output image pixels are formed “using the input image pixel values,” and using the corresponding selected independent color hue control delta value or the corresponding selected independent color saturation control delta value.” ‘435 patent at 11:14-30.

E. By performing arithmetic and logical operations

32. This term is found in all asserted claims of the ‘435 patent. In my opinion the term “by performing arithmetic and logical operations” fails to inform a person of ordinary skill in the art with reasonable certainty about the scope of the claimed invention.

33. This term is indefinite because it is unclear whether this clause modifies “identifying”, “changed”, or both terms. Specifically, the term appears at the end of a long phrase in claim 1 and claim 17: “*identifying* a plurality of said input image pixels having said selected individual color in the real time digital video input image with the hue or the saturation selected to be independently *changed*, by performing arithmetic and logical operations.”

34. From this language, it is unclear whether input image pixels are *identified* by performing arithmetic and logical operations, or if the identified pixels are *changed* by performing arithmetic and logical operations. It is also unclear whether the term applies to both identifying and changing pixels.

35. Thus, the precise meaning of “by performing arithmetic and logical operations” would be unclear to a person of ordinary skill in the art and in my opinion is indefinite.

F. Evaluating and Evaluated

36. The terms “evaluating” and “evaluated” are found in all asserted claims of the ‘435 patent. In my opinion the terms “evaluating” and “evaluated” fails to inform a person of ordinary skill in the art with reasonable certainty about the scope of the claimed invention.

37. “Evaluating” and “evaluated” are not terms with an ordinarily understood technical meaning in the field of digital video systems. As such, applicants of the ‘435 patent created this term to attempt to describe the alleged invention.

38. Additionally, the ‘435 patent provides no guidance as to what is meant by “evaluating” as a step performed in a method. The claims refer to “evaluating independent color hue control functions or independent color saturation control functions,” but the specification does not clarify or explain what this “evaluation” means or entails, although the word “evaluating” is repeated often in the specification. *See, e.g.* ‘435 Patent at 3:32-40; 4:15-33. As an example of how unhelpful the specification is regarding this term, the term, as it is used in the claims, is repeated in the specification using the same exact language as in the claims, with no further explanation. 3:32-40: “by separately evaluating independent color hue control functions or independent color saturation functions . . .”

39. Thus, the scope of “evaluating” and “evaluated” would be unclear to a person of ordinary skill in the art and in my opinion is indefinite.

G. Viewer

40. The term “viewer” is found in claim 17 of the ‘435 patent. In my opinion the term “viewer” means a human, and as used in claim 17, it illustrates that the recited method steps, as discussed below, must actually be performed by someone, as claimed.

41. This construction is supported by the specification, which states that “[a] user or viewer of a real time digital video image display device, such as a television screen, selects to independently change hue, H, or, selects to independently change saturation, S, of an individual color, clr, such as red, green, blue, yellow, cyan, or, magenta, in the real time digital video input image, I, displayed on the real time video image display device, by activating, such as by pushing or turning, an independent color hue control mechanism, or, an independent color saturation control mechanism, such as a button, dial, or graphic user interface (GUI) menu display, configured on a man-machine interaction (MMI) mechanism featured as part of a master control device, such as a built-in master color controller device, or, a wireless remote master color controller device, in operative electronic communication with the real time video image display device.” ‘435 patent at 26:23-37; see also 2:31-39; 3:57-64; 4:63-5:12.

H. All method steps, or the combination of method steps and system elements in a single claim:

operating said master control device . . . ;
selecting an independent color hue control delta value or an independent color saturation control delta value . . . ;
identifying a plurality of said input image pixels . . . ;
determining corresponding output image pixel values . . . ;
displaying a real time digital video output image . . .

42. The terms above appear in claim 17 and thus apply to claim 17 and all its dependent claims, 18-32.

43. The noted combination of terms renders the claims indefinite – A claim that “recites both a system and a method for using that system” is invalid as indefinite. *IPXL*, 430 F.3d at 1384.

44. A person of ordinary skill in the art would understand the active “...ing” terms above to require actual performance of method steps, such as operating, selecting, identifying, determining, and displaying, rather than merely describing capabilities of the system components or elements.

I swear under penalty of perjury under the Laws of the United States that the foregoing is true and correct to the best of my knowledge.

March 16, 2020

Respectfully Submitted,

A handwritten signature in black ink, appearing to read 'Robert Stevenson', with a stylized, flowing script.

Robert Stevenson

EXHIBIT A

Robert Louis Stevenson

Curriculum Vitae

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Professional Experience

10/2013–Present	Associate Chair, Director of Undergraduate Studies Department of Electrical Engineering University of Notre Dame, Notre Dame, Indiana
08/2002–Present	Professor Department of Electrical Engineering University of Notre Dame, Notre Dame, Indiana
01/2003–6/2017	Professor Department of Computer Science and Engineering University of Notre Dame, Notre Dame, Indiana
08/1996–08/2002	Associate Professor Department of Electrical Engineering University of Notre Dame, Notre Dame, Indiana
08/1996–06/1997	Visiting Associate Professor Department of Electrical and Computer Engineering University of Delaware, Newark, Delaware
06/1994–08/1994	Research Associate Intel Corporation, Hillsboro, Oregon
05/1993–08/1993	Research Associate Air Force Office of Scientific Research Rome Laboratories, Griffiss AFB, Rome, New York

08/1990–08/1996 Assistant Professor
 Department of Electrical Engineering
 University of Notre Dame, Notre Dame, Indiana

08/1989–08/1990 Graduate Research Assistant
 School of Electrical Engineering
 Purdue University, West Lafayette, Indiana

08/1986–08/1990 Graduate Teaching Assistant
 School of Electrical Engineering
 Purdue University, West Lafayette, Indiana

06/1986–08/1986 Intern
 Engineering Physics Laboratory, E. I. duPont
 de Nemours & Company, Wilmington, Delaware

06/1985–08/1985 Intern
 Corporate Technology Center
 Sperry Corporation, Reston, Virginia

Education

08/1986–08/1990 *Ph.D., Electrical Engineering*, August 1990
 Purdue University, West Lafayette, Indiana
 Thesis: *Invariant Reconstruction of Curves and Sur-
 faces with Discontinuities with Applications in Com-
 puter Vision*
 Advisor: Professor Edward J. Delp
 GPA: 6.0/6.0

09/1982–06/1986 *B.S.E.E., Electrical Engineering*, June 1986
 University of Delaware, Newark, Delaware
 Thesis: *On the Theoretical Properties of Morphological
 Filters*
 Advisor: Professor Gonzalo R. Arce
 GPA: 4.0/4.0

Honors and Awards

1983 University of Delaware, Tau Beta Pi Prize

1984 University of Delaware, Engineering Scholar

1985–1986 University of Delaware, Liston A. Houston Scholarship

1986 IEEE Delaware Bay Section Engineering Award

1986 Valedictorian, University of Delaware
 1986 Purdue University Graduate Instructor Fellowship
 1986 Phi Kappa Phi Graduate Fellowship
 1986–1990 DuPont Graduate Fellowship in Electrical Engineering
 1986–1989 National Science Foundation Graduate Fellowship
 1993 Dept. of Electrical Engineering Outstanding Teacher Award
 2012 ICIP 2012 Outstanding Reviewer
 2013 IS&T 2013 Service Award

Honor Societies

1985–Present Eta Kappa Nu, Electrical Engineering Honor Society
 1985–Present Tau Beta Pi, Engineering Honor Society
 1985–Present Phi Kappa Phi, Academic Honor Society

Professional Activities

Associate Editor

IEEE Trans. on Image Processing, 1999–2003
IEEE Trans. on Circuits and Systems for Video Tech., 1997–2002
Journal of Electronic Imaging, 1995–1998

Special Issue Editor

Multimedia Systems, *Journal of Electronic Imaging*, 04/1996
 Still Image Compression, *Electronic Imaging Newsletter*, 01/1996

Best Paper Award Board Membership

IEEE Trans. on Circuits and Systems for Video Technology, 2002

Symposium Chairman

SPIE/IS&T Symposium on Electronic Imaging, 02/2004

Conference Chairman

IS&T Conf. Computational Imaging XIX, 01/2021
 IS&T Conf. Computational Imaging XVIII, 01/2020
 IS&T Conf. Computational Imaging XVII, 01/2019
 IS&T Conf. Computational Imaging XVI, 02/2018
 IS&T Conf. Computational Imaging XV, 02/2017
 IS&T Conf. on Visual Information Proc. & Comm. VIII, 02/2017
 IS&T Conf. on Visual Information Proc. & Comm. VII, 02/2016

SPIE/IS&T Conf. on Visual Information Proc. & Comm. VI, 02/2015
 SPIE/IS&T Conf. on Visual Information Proc. & Comm. V, 02/2014
 SPIE/IS&T Conf. on Visual Information Proc. & Comm. IV, 02/2013
 SPIE/IS&T Conf. on Visual Information Proc. & Comm. III, 01/2012
 SPIE/IS&T Conf. on Visual Information Proc. & Comm. II, 01/2011
 SPIE/IS&T Conf. on Visual Comm. and Image Processing, 01/2009
 SPIE/IS&T Conf. on Computational Imaging, 02/2003
 SPIE/IS&T Conf. on Image and Video Comm. and Proc., 02/2000
 SPIE/IS&T Conf. on Visual Comm. and Image Processing, 02/1999
 41st Midwest Symposium on Circuits and Systems, 08/1998
 SPIE Conf. on Electronic Imaging and Signal Processing, 11/1996
 SPIE/IS&T Conf. on Still Image Compression II, 02/1996
 SPIE/IS&T Conf. on Image and Video Processing IV, 02/1996
 SPIE/IS&T Conf. on Image and Video Processing III, 02/1995
 SPIE/IS&T Conf. on Image and Video Processing II, 02/1994

Steering Committee Member

Visual Communications and Image Processing, 1998–2010
 Midwest Symposium on Circuits and Systems, 1994–1999
 Electronic Imaging, 2003–2005

Organizing Committee Member

Nonlinear Signal and Image Processing Workshop, 2001

Technical Program Committee

International Conference on Image Processing, 1998 – Present
 SPIE Computational Imaging, 2003–2016
 Visual Communications and Image Processing, 1997–2008
 European Signal Processing Conference, 2015
 IEEE Symposium on Industrial Electronics & Applications, 2012
 International Conference on Multimedia & Expo, 2009–2010
 Image and Video Communications and Processing III, 2005
 Computational Imaging, 2004
 International Conference on Pattern Recognition, 2000
 Int. Conf. on Acoustics, Speech, & Signal Proc., 2000, 2006–Present
 International Symposium on Circuits and Systems, 1998, 2005
 9th IEEE Image and Multi. Signal Processing Workshop, 1996
 Midwest Symposium on Circuits and Systems, 1994

Member

Institute of Electrical and Electronics Engineers, IEEE
 Society of Photographic Instrumentation Engineers, SPIE
 The Society for Imaging Science and Technology, IS&T

Panel Member for the following funding agencies

National Science Foundation

Reviewer for the following funding agencies

National Science Foundation

U.S. Army Research Office

Israel Science Foundation

Hong Kong Research Grants Council

Kentucky EPSCoR Program

North Dakota EPSCoR Program

Louisiana Board of Regents

Reviewer for the following archival journals

IEEE Transactions on Signal Processing

IEEE Transactions on Image Processing

IEEE Transactions on Circuits and Systems

IEEE Transactions on Circuits and Systems for Video Technology

IEEE Transactions on Instrumentation and Measurement

IEEE Transactions on Medical Imaging

IEEE Transactions on Pattern Analysis and Machine Intelligence

IEEE Transactions on Systems, Man, and Cybernetics

IEEE Transactions on Neural Networks

Pattern Recognition Letters

Signal Processing Letters

Computer Vision, Graphics, and Image Processing

Journal of the Optical Society of America

Journal of Mathematical Imaging and Vision

Applied Optics

IET Image Processing

Reviewer for the following textbook companies

Van Nostrand Reinhold, Electrical Engineering Division

McGraw-Hill, College/Schaum Division

MacMillan Publishing Company

Prentice Hall

Publications

Journals

R. L. Stevenson and G. R. Arce, "Binary Display of Hexagonally Sampled Continuous-Tone Images," *Journal of the Optical Society of America A*, Vol. 2, pp. 1009–1013, July 1985.

G. R. Arce and **R. L. Stevenson**, “On the Synthesis of Median Filter Systems,” *IEEE Transactions on Circuits and Systems*, Vol. CAS-34, No. 4, pp. 420–429, April 1987.

R. L. Stevenson and G. R. Arce, “Morphological Filters: Statistics and Further Syntactic Properties,” *IEEE Transactions on Circuits and Systems*, Vol. CAS-34, No. 11, pp. 1292–1305, November 1987.

R. L. Stevenson and E. J. Delp, “Invariant Recovery of Curves in M-Dimensional Space from Sparse Data,” *Journal of the Optical Society of America A*, Vol. 7, No. 3, pp. 480–490, March 1990.

R. L. Stevenson and E. J. Delp, “Viewpoint Invariant Recovery of Visual Surfaces from Sparse Data,” *IEEE Transactions on Pattern Analysis and Machine Intelligence*, Vol. 14, No. 9, pp. 897–909, September 1992.

R. L. Stevenson and S. M. Schweizer, “A Nonlinear Filtering Structure for Image Smoothing in Mixed Noise Environments,” *Journal of Mathematical Imaging and Vision*, Vol. 2, No. 2/3, pp. 137–154, November 1992.

R. L. Stevenson, G. B. Adams, L. H. Jamieson and E. J. Delp, “Parallel Implementation for Iterative Image Restoration Algorithms on a Parallel DSP Machine,” *Journal of VLSI Signal Processing*, Vol. 5, No. 2/3, pp. 261–272, April 1993.

R. L. Stevenson, B. E. Schmitz, and E. J. Delp, “Discontinuity Preserving Regularization of Inverse Visual Problems,” *IEEE Transactions on Systems, Man and Cybernetics*, Vol. 24, No. 3, pp. 455–469, March 1994.

R. R. Schultz and **R. L. Stevenson**, “Improved Definition Image Expansion,” *IEEE Transactions on Image Processing*, Vol. 3, No. 3, pp. 233–242, May 1994.

T. P. O’Rourke and **R. L. Stevenson**, “Human Visual System Based Wavelet Decomposition for Image Compression,” *Journal of Visual Communications and Representation*, Vol. 6, No. 2, pp. 109–121, June 1995.

R. R. Schultz and **R. L. Stevenson**, “Stochastic Modeling and Es-

timination of Multispectral Image Data,” *IEEE Transactions on Image Processing*, Vol. 4, No. 8, pp. 1109–1119, August 1995.

B. E. Schmitz and **R. L. Stevenson**, “Color Palette Restoration,” *CVGIP: Graphical Models and Image Processing*, Vol. 57, No. 5, pp. 409–419, September 1995.

S. Choi, R. R. Schultz, **R. L. Stevenson**, Y. Huang, and R. Liu, “Contrast Enhancement of Missile Video Sequence via Image Stabilization and Product Correlation,” *Optical Engineering*, Vol. 35, No. 12, pp. 3495–3507, December 1995.

T. P. O’Rourke and **R. L. Stevenson**, “Improved Image Decompression for Reduced Transform Coding Artifacts,” *IEEE Transactions on Circuits and Systems for Video Technology*, Vol. 5, No. 6, pp. 490–499, December 1995.

R. R. Schultz and **R. L. Stevenson**, “Extraction of High-Resolution Frames from Video Sequences,” *IEEE Transactions on Image Processing*, special issue on Nonlinear Image Processing, Vol. 5, No. 6, pp. 996–1011, June 1996.

R. L. Stevenson, “Inverse Halftoning via MAP Estimation,” *IEEE Transactions on Image Processing*, Vol. 6, No. 4, pp. 574–583, April 1997.

B. E. Schmitz and **R. L. Stevenson**, “Enhancement of Sub-Sampled Color Image Data,” *IEEE Transactions on Image Processing*, special issue on Color Image Processing, Vol. 6, No. 7, pp. 1052–1056, July 1997.

R. R. Schultz, L. Meng, and **R. L. Stevenson**, “Subpixel Motion Estimation for Super-Resolution Image Sequence Enhancement,” *Journal of Visual Communication and Image Representation*, special issue on High-Fidelity Media Processing, Vol. 9, No. 1, pp. 38–50, March 1998.

R. Lladós-Bernaús and **R. L. Stevenson**, “Fixed Length Entropy Coding for Robust Video Compression,” *IEEE Transactions on Circuits and Systems for Video Technology*, Vol. 8, No. 6, pp. 745–755, October 1998.

R. Lladós-Bernaús and **R. L. Stevenson**, “Edge Assisted Upper Band

Coding Techniques”, *International Journal of Imaging Systems and Technology*, Vol. 10, pp. 67–75, January 1999.

Z. Peng, Y.-F. Huang, D. J. Costello, Jr., and **R. L. Stevenson**, “A Pyramidal Image Coder Using Generalized Rank-Ordered Prediction Filter”, *IEEE Transactions on Circuits & Systems for Video Technology*, Vol. 9, No. 4, pp. 540–544, June 1999.

M. A. Robertson and **R. L. Stevenson**, “Reduced-Complexity Iterative Post-Filtering of Video,” *IEEE Transactions on Circuits and Systems for Video Technology* Vol. 11, No. 10, pp. 1121–1128, October 2001.

M. A. Robertson and **R. L. Stevenson**, “Temporal Resolution Enhancement in Compressed Video Sequences,” *EURASIP Journal on Applied Signal Processing*, Special Issue on Nonlinear Signal Processing, pp. 230–238, December 2001.

B. E. Marino and **R. L. Stevenson**, “Improving the Performance of Single Chip Image Capture Devices,” *Journal of Electronic Imaging*, Vol. 12, No. 2, pp. 209–218, April 2003.

M. A. Robertson, S. Borman, and **R. L. Stevenson**, “Estimation-Theoretic Approach to Dynamic Range Improvement Through Multiple Exposures,” *Journal of Electronic Imaging* Vol. 12, No. 2, pp. 219–228, April 2003.

R. Magill, C. E. Rohrs, and **R. L. Stevenson**, “Output-Queued Switch Emulation by Fabrics with Limited Memory,” *IEEE Journal on Selected Areas in Communications*, Special Issue on High-Performance Electronic Switches/Routers for High-Speed Internet, Vol. 21, No. 4., pp. 606–615, May 2003.

M. A. Robertson and **R. L. Stevenson**, “DCT Quantization Noise in Compressed Images,” *IEEE Transactions on Circuits and Systems for Video Technology*, Vol. 15, No. 1, pp. 27–38, January 2005.

J. Gai and **R. L. Stevenson**, “Studentized Dynamical System for Robust Object Tracking,” *IEEE Transactions on Image Processing*, Vol. 20, No. 1, pp. 186–199, January, 2011.

J. Gai and **R. L. Stevenson**, “Robust Contour Tracking Based On

A Coupling Between Geodesic Active Contours and Conditional Random Fields,” *Journal of Visual Communications and Image Representations*, Vol. 22, No. 1, pp. 22-47, January 2011.

J. Simpkins and **R. L. Stevenson**, “A Parameterized Spatially-Varying PSF Model,” *Journal of Electronic Imaging*, Vol. 23, No. 1, January, 2014.

Y. Li, and **R. L. Stevenson**, “Incorporating Global Information in Feature-Based Multimodal Image Registration,” *Journal of Electronic Imaging*, Vol. 23, No. 2, March-April 2014.

Y. Li, and **R. L. Stevenson**, “A Similarity Metric for Matching Incomplete Edge Curves,” *International Journal of Machine Intelligence and Sensory Signal Processing*, Vol. 1, No. 2, pp. 153-173, 2014.

L. Hollmann and **R. L. Stevenson**, “Pole-Zero Placement Algorithm for the Design of Digital Filters with Fractional-Order Rolloff,” *Signal Processing* special issue on fractional signal processing and applications, Vol. 107, pp. 218-229, February 2015.

R. Zhen, and **R. L. Stevenson**, “Multi-Image Motion Deblurring Aided By Inertial Sensors,” *Journal of Electronic Imaging*, Vol. 25, No. 1, February 2016 .

Y. Li, and **R. L. Stevenson**, “Multimodal Image Registration With Line Segments By Selective Search,” *IEEE Transactions on Cybernetics*, Vol. PP, No. 99, April 2016.

L. Hollmann and **R. L. Stevenson**, “Adaptive whitening of ambient ocean noise with narrowband signal preservation” *Journal of the Acoustical Society of America*, Vol. 129, No. 6, pp. 3122, 3133, June, 2016.

R. Zhen and **R. L. Stevenson**, “Inertial Sensor Aided Multi-Image Nonuniform Motion Blur Removal Based on Motion Decomposition,” *Journal of Electronic Imaging*, Vol. 27, No. 5, October, 2018.

Y. Li, L. Wang, **R. L. Stevenson**, L. Wei, and R. Fan, “Reliable Line Segment Matching for Multispectral Images Guided by Intersection Matches,” *IEEE Transactions on Circuits and Systems for Video Technology*, Vol. 29, No. 10, October 2019

J. Simpkins and **R. L. Stevenson**, “An Efficient Method for Non-Blind Estimation of Spatially-Varying Point Spread Functions,” submitted to *Journal of Electronic Imaging*.

S. Zhang, A. Zhen, and **R. L. Stevenson**, “Deep Motion Blur Removal Using Noisy/Blurry Image Pairs,” submitted to *IEEE Transactions on Multimedia*.

M. R. Izadi, **R. L. Stevenson**, and L. N. Kloepper “Separation of Overlapping Sources in Bioacoustic Mixtures,” submitted to *Journal of the Acoustical Society of America*.

Journals Articles Reprinted in Books

R. L. Stevenson and G. R. Arce, “Binary Display of Hexagonally Sampled Continuous-Tone Images,” originally appeared as *Journal of the Optical Society of America A*, Vol. 2, pp. 1009–1013, July 1985, reprinted in *Selected Papers on Digital Halftoning*, SPIE Milestone Series, Vol. MS 154, J. Allebach, Ed., 1999.

Book Chapters

R. L. Stevenson and E. J. Delp, “Investigation into Building an Invariant Surface Model from Sparse Data,” in *NATO ASI: Active Perception and Robot Vision*, A. Sood and H. Wechsler, Eds., Springer Verlag, pp. 539–558, 1992.

R. L. Stevenson and E. J. Delp, “Three-Dimensional Surface Reconstruction: Theory and Implementation,” in *3D Object Recognition Systems*, A. K. Jain and P. J. Flynn, Eds., Elsevier, pp. 89–114, 1993.

D. L. Cohn and **R. L. Stevenson**, “Using Redundancy to Speed up Disk Arrays,” in *Communications and Cryptography: Two Sides of One Tapestry*, R. E. Blahut, D. J. Costello, Jr., U. Maurer and T. Mittelholzer, Eds., Kluwer Academic Publishers, pp. 59–68, 1994.

R. Lladós-Bernaus, M. Robertson and **R. L. Stevenson**, “A Stochastic technique for the removal of artifacts in compressed images and video”, in *Signal Recovery Techniques for Image and Video Compression and Transmission*, A. K. Katsaggelos and N. P. Galatsanos, Eds., Kluwer Academic Publishers, 1998.

S. Borman and **R. L. Stevenson**, “Image Sequence Processing,” in *Dekker Encyclopedia of Optical Engineering*, R. B. Johnson, C. Hoffman, and R. G. Driggers, Eds., Marcel Dekker, Inc., 2003.

R. Schultz and **R. L. Stevenson**, “Bayesian Image and Video Enhancement Using a Non-Gaussian Prior,” in *Nonlinear Signal and Image Processing: Theory, Methods, and Applications*, K. Barner and G. Arce, Eds., CRC Press, 2003.

J. Simpkins and **R. L. Stevenson**, “An Introduction to Super-Resolution Imaging,” in *Mathematical Optics: Classical, Quantum, and Imaging Methods*, V. Lakshminarayanan, Ed., Taylor & Francis Books, Inc., 2012.

J. Simpkins, **R. L. Stevenson**, and S. Borman, “Image Sequence Processing,” in *Encyclopedia of Optical Engineering*, R. G. Driggers and C. Hoffman, Eds., Taylor & Francis, 2015.

R. Zhen and **R. L. Stevenson**, “Image Demosaicing,” *Color Image and Video Enhancement*, pp. 13–54, Springer, 2015.

Edited Conference Proceedings

S. A. Rajala and **R. L. Stevenson**, Eds., *Image and Video Processing II*, SPIE Proceedings Series, 1994.

R. L. Stevenson and S. A. Rajala, Eds., *Image and Video Processing III*, SPIE Proceedings Series, 1995.

R. L. Stevenson and M. I. Sezan, Eds., *Image and Video Processing IV*, SPIE Proceedings Series, 1996.

R. L. Stevenson, A. Drukarev, and T. R. Gardos, Eds., *Still Image Compression II*, SPIE Proceedings Series, 1996.

C.-S. Li, **R. L. Stevenson**, and L. Zhou, Eds., *Electronic Imaging and Multimedia Systems*, SPIE Proceedings Series, 1996.

R. L. Stevenson, Ed., *Proceeding of the Midwest Symposium on Circuits and Systems*, 1998.

K. Aizawa, **R. L. Stevenson**, and Y.-Q. Zhang, Eds., *Visual Commu-*

nications and Image Processing '99, SPIE Proceedings Series, 1999.

B. Vasudev, T. R. Hsing, A. G. Tescher, and **R. L. Stevenson**, Eds., *Image and Video Communications and Processing 2000*, SPIE Proceedings Series, 2000.

C. Bouman and **R. L. Stevenson**, Eds., *Computational Imaging 2003*, SPIE Proceedings Series, 2003.

M. Rabbani and **R. L. Stevenson**, Eds., *Visual Communications and Image Processing 2009*, SPIE Proceedings Series, 2009.

A. Said, O. G. Guleryuz, and **R. L. Stevenson**, Eds., *Visual Information Processing and Communication II*, SPIE Proceedings Series, 2011.

A. Said, O. G. Guleryuz, and **R. L. Stevenson**, Eds., *Visual Information Processing and Communication III*, SPIE Proceedings Series, 2012.

A. Said, O. G. Guleryuz, and **R. L. Stevenson**, Eds., *Visual Information Processing and Communication IV*, SPIE Proceedings Series, 2013.

A. Said, O. G. Guleryuz, and **R. L. Stevenson**, Eds., *Visual Information Processing and Communication V*, SPIE Proceedings Series, 2014.

A. Said, O. G. Guleryuz, and **R. L. Stevenson**, Eds., *Visual Information Processing and Communication VI*, SPIE Proceedings Series, 2015.

A. Said, O. G. Guleryuz, and **R. L. Stevenson**, Eds., *Visual Information Processing and Communication VII*, IS&T, 2016.

R. L. Stevenson and E. Delp, Eds., *Visual Information Processing and Communication VIII*, IS&T, 2017.

C. Bouman and **R. L. Stevenson**, Eds., *Computational Imaging XV*, IS&T, 2017.

C. Bouman and **R. L. Stevenson**, Eds., *Computational Imaging XVI*, IS&T, 2018.

C. Bouman, G. T. Buzzard, and **R. L. Stevenson**, Eds., *Computational Imaging XVII*, IS&T, 2019.

C. Bouman, G. T. Buzzard, and **R. L. Stevenson**, Eds., *Computational Imaging XVIII*, IS&T, 2020.

Conference Papers

G. R. Arce and **R. L. Stevenson**, “On the Synthesis of Median Filter Systems,” *Proceedings of the 1986 Princeton Conference on Information Sciences and Systems*, pp. 711–716, Princeton, New Jersey, March 1986.

R. L. Stevenson and G. R. Arce, “Theoretical Analysis of Morphological Filters,” *Proceedings of the 24th Annual Allerton Conference on Communication, Control, and Computing*, pp. 353–362, Allerton, IL, October 1986.

R. L. Stevenson and E. J. Delp, “Investigation into Building an Invariant Surface Model from Sparse Data,” *NATO ASI on Active Perception and Robot Vision*, Maratea, Italy, July 16–29, 1989.

R. L. Stevenson, “Machine Vision Systems for Component Assembly and Measurements,” *Proceedings of the Fluid Power Technical Update Seminar*, pp. 98–107, West Lafayette, IN, August 2–4, 1989.

J. Song, **R. L. Stevenson**, and E. J. Delp, “The Use of Mathematical Morphology in Image Enhancement,” *Proceedings of the 32nd Midwest Symposium on Circuits and Systems*, pp. 67–70, Urbana, IL, August 14–16, 1989.

R. L. Stevenson and E. J. Delp, “Invariant Reconstruction of Visual Surfaces,” *Proceedings of the IEEE Workshop on the Interpretation of 3D Scenes*, pp. 131–137, Austin, TX, November 27–29, 1989.

R. L. Stevenson and E. J. Delp, “Fitting Curves with Discontinuities,” *Proceedings of the IEEE International Workshop on Robust Computer Vision*, pp. 127–136, Seattle, WA, October 1–3, 1990.

R. L. Stevenson, G. B. Adams, L. H. Jamieson and E. J. Delp, “Three-Dimensional Surface Reconstruction on the AT&T Pixel Machine,” *Proceedings of the 24th Annual Asilomar Conference on Signals*,

Systems and Computers, pp. 544–548, Pacific Grove, CA, November 5–7, 1990.

R. L. Stevenson and E. J. Delp, “Invariant Reconstruction of 3D Curves and Surfaces,” *Proceedings of the SPIE Conference on Intelligent Robots and Computer Vision*, pp. 364–375, Boston, MA, November 4–9, 1990.

R. L. Stevenson and E. J. Delp, “Viewpoint Invariant Recovery of Visual Surfaces from Sparse Data,” *Proceedings of the Third International Conference on Computer Vision*, pp. 309–312, Osaka, Japan, December 4–7, 1990.

R. L. Stevenson and E. J. Delp, “Surface Reconstruction with Discontinuities,” *Proceedings of the SPIE Conference on Curves and Surfaces in Computer Vision and Graphics II*, pp. 46–57, Boston, MA, November 10–15, 1991.

R. L. Stevenson, “A Nonlinear Estimation Technique for Filtering Images Corrupted with Gaussian Noise,” *Proceedings of the SPIE/IS&T Conference on Nonlinear Image Processing III*, pp. 210–221, San Jose, California, February 9–14, 1992.

R. R. Schultz and **R. L. Stevenson**, “Improved Definition Image Expansion,” *Proceedings of the 1992 International Conference on Acoustics, Speech and Signal Processing*, pp. III:173–176, San Francisco, California, March 23–26, 1992.

J. Wang, **R. L. Stevenson**, and Richard R. Schultz, “Recovery of Image Information from Halftone Information,” *Proceedings of the Fifth Digital Signal Processing Workshop*, pp. 6.3.1–6.3.2, Starved Rock State Park, IL, September 13–16, 1992.

R. R. Schultz and **R. L. Stevenson**, “Parameter Estimation for Discontinuity– Preserving Stochastic Signal Models,” *Proceedings of the Thirtieth Annual Allerton Conference on Communication, Control, and Computing*, pp. 319–328, Allerton, IL, September 30 – October 2, 1992.

S. M. Schweizer and **R. L. Stevenson**, “Predetection of Impulse Locations in a Mixed Noise Environment,” *Proceedings of the Third Annual Argonne Symposium for Undergraduates in Science, Engineering*

and *Mathematics*, p. 73, Argonne National Laboratory, Argonne, IL, November 6–7, 1992.

S. M. Schweizer and **R. L. Stevenson**, “A Bayesian Approach to Inverse Halftoning,” *Proceedings of the SPIE/IS&T Conference on Human Vision, Visual Processing and Digital Display IV*, pp. 282–292, San Jose, CA, January 31 – February 5, 1993.

R. L. Stevenson, “Reduction of Coding Artifacts in Transform Image Coding,” *Proceedings of the 1993 International Conference on Acoustics, Speech and Signal Processing*, pp. V:401–404, Minneapolis, MN, April 27–30, 1993.

T. P. O’Rourke and **R. Stevenson**, “Human Visual System Based Subband Image Compression,” *Proceedings of the Thirty-First Annual Allerton Conference on Communication, Control, and Computing*, pp. 452–461, Allerton, IL, September 29 – October 1, 1993.

B. E. Schmitz and **R. L. Stevenson**, “Parameter Estimation for the Curve Recovery Problem,” *Proceedings of the Thirty-First Annual Allerton Conference on Communication, Control, and Computing*, pp. 485–494, Allerton, IL, September 29 – October 1, 1993.

M. A. Lexa and **R. Stevenson**, “Filtering Video Sequences using Non-linear Techniques,” *Proceedings of the Fourth Annual Argonne Symposium for Undergraduates in Science, Engineering and Mathematics*, p. 83, Argonne National Laboratory, Argonne, IL, November 5–6, 1993.

M. P. Witzman, R. R. Schultz and **R. Stevenson**, “Computation of MAP Signal Estimates using a Gradient Descent Window Operator,” *Proceedings of the Fourth Annual Argonne Symposium for Undergraduates in Science, Engineering and Mathematics*, p. 84, Argonne National Laboratory, Argonne, IL, November 5–6, 1993.

T. P. O’Rourke and **R. Stevenson**, “Improved Image Decompression for Reduced Transform Coding Artifacts,” *Proceedings of the SPIE/IS&T Conference on Image and Video Processing, II*, pp. 90–101, San Jose, CA, February 6–10, 1994.

R. R. Schultz, S. Choi, **R. L. Stevenson**, Y. Huang, R. Liu and L. Morine, “Contrast Enhancement of Missile Data Through Image Sequence Stabilization and Product Correlation,” *Proceedings of the*

SPIE/IS&T Conference on Image and Video Processing, II, pp. 164–175, San Jose, CA, February 6–10, 1994.

B. E. Schmitz and **R. L. Stevenson**, “Color Palette Restoration,” *Proceedings of the SPIE/IS&T Conference on Human Vision, Visual Processing and Digital Display, V*, pp. 327–338, San Jose, CA, February 6–10, 1994.

R. R. Schultz, H. M. Zayed, **R. L. Stevenson**, R. J. Minniti and G. H. Bernstein, “ASIC Design for Robust Signal and Image Processing,” *Proceedings of the Fourth Great Lakes Symposium on VLSI*, pp. 138–143, Notre Dame, IN, March 4–5, 1994.

T. L. Piatt and **R. L. Stevenson**, “The Use of Block-Matching Motion Estimation in Image Filtering,” appeared at the *National Conference on Undergraduate Research*, Western Michigan University, Kalamazoo, MI, April 14–16, 1994.

M. P. Witzman, R. R. Schultz and **R. L. Stevenson**, “Computation of Partial Signal MAP Estimates,” appeared at the *National Conference on Undergraduate Research*, Western Michigan University, Kalamazoo, MI, April 14–16, 1994.

R. R. Schultz and **R. L. Stevenson**, “Stochastic Modeling and Estimation of Multispectral Image Data,” *Proceedings of the 1994 International Conference on Acoustics, Speech and Signal Processing*, pp. V:373–376, Adelaide, Australia, April 19–22, 1994.

R. R. Schultz and **R. L. Stevenson**, “A Window-Based Bayesian Estimator for Noise Removal,” *Proceedings of the 37th Midwest Symposium on Circuits and Systems*, pp. 860–863, Lafayette, LA, August 3–5, 1994.

R. R. Schultz, **R. L. Stevenson**, and A. Lumsdaine, “Maximum Likelihood Parameter Estimation for Non-Gaussian Prior Signal Models,” *Proceedings of the 1994 IEEE International Conference on Image Processing*, pp. II:700–704, Austin, TX, November 13–16, 1994.

R. R. Schultz and **R. L. Stevenson**, “Video Resolution Enhancement,” *Proceeding of the SPIE/IS&T Conference on Image and Video Processing, III*, pp. 23–34, San Jose, CA, February 5–10, 1995.

J. Squyres, A. Lumsdaine, and **R. L. Stevenson**, “Cluster-Base Image

Processing,” *Proceedings of the SPIE/IS&T Conference on Image and Video Processing, III*, pp. 228-239, San Jose, CA, February 5–10, 1995.

R. R. Schultz and **R. L. Stevenson**, “Improved Definition Video Frame Enhancement,” *Proceedings of The 1995 IEEE International Conference on Acoustics, Speech and Signal Processing*, pp. 2169–2172, Detroit, MI, May 9–12, 1995.

T. P. O’Rourke, **R. L. Stevenson**, L. Perez, D. J. Costello, Jr., and Y.-F. Huang, “Robust Transmission of Compressed Images over Noisy Gaussian Channels,” *Proceedings of The 1995 IEEE International Conference on Acoustics, Speech and Signal Processing*, pp. 2319–2322, Detroit, MI, May 9–12, 1995.

R. L. Stevenson and R. R. Schultz (invited), “Extraction of High-Resolution Frames from Video Sequences,” *IEEE Workshop on Non-linear Image Processing*, pp. 718–721, Greece, June 20–22, 1995.

J. Squyres, A. Lumsdaine, and **R. L. Stevenson**, “A Parallel Image Processing Toolkit Using MPI,” *Proceedings the MPI Developers Conference*, <http://www.cse.nd.edu/mpidc95/>, Notre Dame, IN, June 22-23, 1995.

R. L. Stevenson, “Reduction of Coding Artifacts in Low-Bit-Rate Video Coding,” *Proceedings of the 1995 Midwest Symposium on Circuits and Systems*, pp. 854–857, Rio de Janeiro, Brazil, August 1995.

B. E. Schmitz and **R. L. Stevenson**, “Color Space Expansion,” *Proceedings of the 1995 Midwest Symposium on Circuits and Systems*, pp. 133–136, Rio de Janeiro, Brazil, August 1995.

T. P. O’Rourke, **R. L. Stevenson**, D. J. Costello, Jr. and Y.-F. Huang, “Improved Decoding of Compressed Images Received over Noisy Channels,” *Proceedings of the 1995 IEEE International Conference on Image Processing*, pp. II:65–68, Washington, DC, October 1995.

R. R. Schultz and **R. L. Stevenson**, “Motion Compensated Scan Conversion of Interlaced Video Sequences,” *Proceedings of the SPIE/IS&T Conference on Image and Video Processing IV*, pp. 107–118, San Jose, CA, February 1996.

B. E. Schmitz and **R. L. Stevenson**, “Enhancement of Sub-Sampled

Color Image Data,” *Proceedings of the SPIE/IS&T Conference on Image and Video Processing IV*, pp. 97-106, San Jose, CA, February 1996.

T. P. O’Rourke, and **R. L. Stevenson**, “Vector Quantization with Distance Constraints for Enhanced Post-Processing,” *Proceedings of the SPIE/IS&T Conference on Still Video Compression II*, pp. 9–20, San Jose, CA, February 1996.

J. M. Squyres, A. Lumsdaine, B. C. McCandless, and **R. L. Stevenson**, “Parallel and Distributed Algorithms for High Speed Image Processing,” *Proceedings of the Sixth Annual Dual-Use Technologies & Applications Conference*, pp. 185–190, Syracuse, NY, June 1996.

J. Brockman, S. Batill, J. Renaud, J. Kantor, D. Kirkner, P. Kogge, and **R. L. Stevenson**, “Development of a Multidisciplinary Engineering Design Laboratory at the University of Notre Dame,” *Proceedings of the ASEE Annual Conference*, Washington, D.C., June 1996.

R. R. Schultz and **R. L. Stevenson**, “Sub-Pixel Motion Estimation,” *Proceedings of the 1996 Midwest Symposium on Circuits and Systems*, pp. 1385–1388, Ames, Iowa, August 1996.

R. Lladós-Bernaús and **R. L. Stevenson**, “Reduction of Coding Artifacts in Video Compression,” *Proceedings of the SPIE Internal Conference on Electronic Imaging and Signal Processing*, pp. 2–10, Beijing, China, November 1996.

R. Lladós-Bernaús and **R. L. Stevenson**, “A Robust Low-Bit Rate 3D Subband Codec,” *Proceedings of the SPIE/IS&T Internal Conference on Visual Communications and Image Processing*, pp. 610–521, San Jose, CA, February 1997.

R. R. Schultz, L. Meng, and **R. L. Stevenson**, “Subpixel Motion Estimation for Multiframe Resolution Enhancement,” *Proceedings of the SPIE/IS&T Internal Conference on Visual Communications and Image Processing*, pp. 1317–1328, San Jose, CA, February 1997.

M. J. Wahoske, R. W. Liu, and **R. L. Stevenson**, “Dual-Receiver Blind Identification for Image Blurs,” *Proceedings of the 1997 IEEE International Conference on Circuit and Systems*, vol. 2, pp. 1377-1380, Hong Kong, June 1997.

R. Lladós-Bernaús and **R. L. Stevenson**, “Addition of Robustness to Standard Video Compression Protocols”, *Proceedings of the IEEE Midwest Symposium on Circuits and Systems*, pp. 921–924, Sacramento, CA, August 1997.

R. Lladós-Bernaús and **R. L. Stevenson**, “Fixed Length Entropy Coding for Robust Video Compression”, *Proceedings of the IEEE International on Image Processing*, Vol. II, pp. 97–100, Santa Barbara, CA, October 1997.

R. Schultz and **R. L. Stevenson**, “Bayesian Estimation of Subpixel-Resolution Motion Fields and High-Resolution Video Stills,” *Proceedings of the IEEE International Conference on Image Processing*, Vol. III, pp. 62–65, Santa Barbara, CA, October 1997.

J. He, D. Costello, Y. F. Huang, and **R. L. Stevenson**, “On the Application of Turbo Codes to the Robust Transmission of Compressed Images,” *Proceedings of the IEEE International Conference on Image Processing*, Vol. III, pp. 559–562, Santa Barbara, CA, October 1997.

Z. Peng, Y. F. Huang, D. Costello, and **R. L. Stevenson**, “Image Compression using Region-Activity-Based Pyramidal Coding and Iterative Vector Quantizer,” *Proceedings of the IEEE International Conference on Image Processing*, Vol. III, pp. 698–701, Santa Barbara, CA, October 1997.

R. Lladós-Bernaús and **R. L. Stevenson**, “Edge-Assisted Upper Bands Coding Techniques”, *Proceedings of the SPIE/IS&T International Conference on Visual Communications and Image Processing*, pp. 2–13, San Jose, CA, January 1998.

Z. Peng, Y. F. Huang, D. Costello, and **R. L. Stevenson**, “Joint Source/Channel Decoding for Image Transmission – A Turbo Code Approach,” *Proceedings of the Conference on Information Sciences and Systems*, pp. 330–335, Princeton, NJ, March 1998.

R. Lladós-Bernaús and **R. L. Stevenson**, “Codeword Assignment for Fixed-Length Entropy Coded Video Streams”, *IEEE Data Compression Conference*, pp. 269–275, Snowbird, UT, March 1998.

R. R. Schultz and **R. L. Stevenson**, “Estimation of Subpixel-Resolution Motion Fields from Segmented Image Sequences”, *Proceedings of the*

SPIE International Conference on Sensor Fusion: Architectures, Algorithms, and Applications II, pp. 90–101, Orlando, FL, April 1998.

Z. Peng, Y. F. Huang, D. Costello, and **R. L. Stevenson**, “Joint Channel and Source Decoding for Vector Quantized Images using Turbo Codes,” *Proceedings of the IEEE International Symposium on Circuits and Systems*, pp. IV:5–8, Monterey, CA, May 1998.

J. M. Squires, A. Lumsdaine and **R. L. Stevenson**, “A Toolkit for Parallel Image Processing, *Proceedings of the SPIE International Conference on Parallel and Distributed Methods for Image Processing II*, pp. 69–71, San Diego, CA, July 1998.

R. Lladós-Bernaus and **R. L. Stevenson**, “Bidirectional Block Placement in Corrupted Fixed-Length Entropy Coded Video Streams”, *Proceedings of the IEEE Midwest Symposium on Circuits and Systems*, pp. 391–394, Notre Dame, IN, August 1998.

M. Robertson and **R. L. Stevenson**, “Reducing the Complexity of Iterative Post-Processing of Video,” *Proceedings of the IEEE Midwest Symposium on Circuits and Systems*, pp. 399–402, Notre Dame, IN, August 1998.

S. Borman and **R. L. Stevenson**, “Super-Resolution Still from Image Sequences – A Review,” *Proceedings of the IEEE Midwest Symposium on Circuits and Systems*, pp. 374–378, Notre Dame, IN, August 1998.

Z. Peng, Y. F. Huang, D. Costello, and **R. L. Stevenson**, “Joint Decoding for Turbo Codes for Subband Coded Image,” *Proceedings of the IEEE International Conference on Image Processing*, pp. I:329–333, Chicago, IL, October 1998.

M. Robertson and **R. L. Stevenson**, “Reducing the Complexity of a MAP Post-Processing Algorithm for Video Sequences,” *Proceedings of the IEEE International Conference on Image Processing*, pp. I:372–376, Chicago, IL, October 1998.

Z. Peng, Y. F. Huang, D. Costello, and **R. L. Stevenson**, “On the Tradeoff Between Source and Channel Coding Rates for Image Transmission,” *Proceedings of the IEEE International Conference on Image Processing*, pp. II:118–121, Chicago, IL, October 1998.

R. Lladós-Bernaus and **R. L. Stevenson**, “Computationally Efficient Fixed-Length Entropy Codec for Robust Video Compress,” *Proceedings of the IEEE International Conference on Image Processing*, pp. III:85–89, Chicago, IL, October 1998.

S. Borman, M. Robertson, and **R. L. Stevenson**, “Block-Matching Sub-Pixel Motion Estimation from Noisy Under-Sampled Frames – An Empirical Performance Evaluation,” *Proceedings of the SPIE/IS&T Conference on Visual Communication and Image Processing '99*, Vol. 3653, pp. 1442–1451, January 25–27, 1999.

M. A. Robertson, S. Borman, and **R. L. Stevenson**, “Dynamic Range Improvement Through Multiple Exposures,” *Proceedings of the International Conference on Image Processing*, pp. III:159–163, Kobe, Japan, October 1999.

S. Borman and **R. L. Stevenson**, “Simultaneous Multi-frame MAP Super-Resolution Video Enhancement using Spatio-temporal Priors”, *Proceedings of the International Conference on Image Processing*, pp. III:469–473, Kobe, Japan, October 1999.

M. A. Robertson and **R. L. Stevenson**, “Restoration of Compressed Video using Temporal Information,” *Proceedings of the SPIE/IS&T Visual Communications and Image Processing 2001*, pp. 21–29, San Jose, CA, January 2001.

M. A. Robertson and **R. L. Stevenson**, “Temporal Resolution Enhancement in Compressed Video,” *Nonlinear Signal and Image Processing 2001*, Baltimore, MD, June 2001.

M. A. Robertson and **R. L. Stevenson**, “DCT Quantization Noise in Compressed Images,” *Proceedings of the International Conference on Image Processing 2001*, Thessaloniki, Greece, pp. 185–188, October, 2001.

K. Erickson and **R. L. Stevenson**, “Frame Type Selection for Off-Line MPEG Encoding,” *Proceedings of SPIE/IS&T Visual Communications and Image Processing 2001*, San Jose, CA, pp. 406–414, January 2002.

D. P. Bennett, J. Bally, I. Bond, E. Cheng, K. Cook, D. Deming, P. Garnavich, K. Griest, D. Jewitt, N. Kaiser, T. R. Lauer, J. Lunine, G. Luppino, J. C. Mather, D. Minniti, S. J. Peale, S. H. Rhie, J. Rhodes,

J. Schneider, G. Sonneborn, **R. Stevenson**, C. Stubbs, D. Tenerelli, N. Woolf, and P. Yock, “The Galactic Exoplanet Survey Telescope (GEST)”, *Proceedings of the SPIE International Conference on Future EUV/UV and Visible Space Astrophysics Missions and Instrumentation*, pp. 141–155, Waikoloa, HI, August 2002.

R. Magill, C. E. Rohrs, and **R. L. Stevenson**, “Revisiting Output Queued Switch Emulation by a Combined Input/Output Queued Switch,” *Proceedings of the Fortieth Annual Allerton Conference on Communication, Control, and Computing*, Allerton, IL, October 2 – 4, 2002.

R. Magill, C. E. Rohrs, and **R. L. Stevenson**, “Output Queued Switch Emulation by a Buffered Crossbar Fabric,” *Proceedings of the Fortieth Annual Allerton Conference on Communication, Control, and Computing*, Allerton, IL, October 2 – 4, 2002.

S. Borman and **R. L. Stevenson**, “Image resampling and constraint formulation for multi-frame super-resolution restoration,” *Proceedings of the SPIE/IS&T Conference on Computational Imaging II*, Santa Clara, CA, pp. 234–245, January 20 – 24, 2003.

G. Zhang and **R. L. Stevenson**, “A Modified Fixed-Length Entropy Coding Algorithm for Robust Video Compression,” *Proceedings of the SPIE/IS&T Conference on Image and Video Communications and Processing 2003*, Santa Clara, CA, pp. 470–478, January 20 – 24, 2003.

S. Borman and **R. L. Stevenson**, “Linear models for multi-frame super-resolution restoration under non-affine registration and spatially varying PSF,” *Proceedings of the SPIE/IS&T Conference on Computational Imaging*, San Jose, CA, January 18 – 22, 2004.

G. Zhang, and **R. L. Stevenson**, “Efficient Error Recovery for Multiple Description Video Coding,” *Proceedings of the International Conference on Image Processing 2004*, Singapore, pp. 829–832, October, 2004.

G. Zhang and **R. L. Stevenson**, “Error Resilient Video Coding Using Virtual Reference Picture,” *Proceedings of the SPIE/IS&T Conference on Image and Video Communications and Processing 2005*, San Jose, CA, pp. 896–903, January 18–20, 2005.

G. Zhang, **R. L. Stevenson**, “Hybrid Scalable Video Coding with Multiple Description and Layered Coding,” *Proceedings of the SPIE/IS&T Conference on Visual Communications and Image Processing 2006*, San Jose, CA, January 2006.

Y. Li, **R. L. Stevenson**, J. Gai, “Detection of Junction in Images,” *Proceeding of the SPIE/IS&T Conference on Image Processing: Algorithms and Systems V*, San Jose, CA, February 2007.

Y. Li, **R. L. Stevenson**, “Multimodal Image Registration Based on Edges and Junctions,” *Proceeding of the SPIE/IS&T Conference on Visual Communications and Image Processing 2007*, San Jose, CA, January 2007.

J. Gai and **R. L. Stevenson**, “A Robustified Hidden Markov Model for Visual Tracking with Subspace Representation,” *Proceeding of the SPIE/IS&T Conference on Visual Communications and Image Processing 2007*, San Jose, CA, January 2007.

Y. , **R. L. Stevenson**, and J. Gai “Corner-Guided Image Registration by using Edges,” *Proceedings of the International Conference on Image Processing 2007*, San Antonio, TX, pp. V:361-364, September, 2007.

J. Gai, Y. Li, and **R. L. Stevenson**, “Coupled Hidden Markov Models for Robust EO/IR Target Tracking,” *Proceedings of the International Conference on Image Processing 2007*, San Antonio, TX, pp. I:41-44, September, 2007.

Y. Li, **R. L. Stevenson**, and J. Gai , “Line segment based image registration,” *Proceeding of the SPIE/IS&T Conference on Visual Communications and Image Processing 2008*, San Jose, CA, January 2008.

J. Gai, Y. Li, and **R. L. Stevenson**, “Robust Bayesian PCA with Students t-distribution: The variational inference approach,” *Proceedings of 15th IEEE International Conference on Image Processing*, pp. 1340 - 1343, San Diego, CA, October 2008.

J. Gai, Y. Li, and **R. L. Stevenson**, “An EM algorithm for robust Bayesian PCA with students t-distribution,” *Proceedings of 15th IEEE International Conference on Image Processing*, pp. 2672 - 2675, San Diego, CA, October 2008.

Y. Li, **R. L. Stevenson**, and J. Gai , “Curve matching in the framework of Riemannian geometry,” *Proceeding of the SPIE/IS&T Conference on Visual Communications and Image Processing 2009*, San Jose, CA, January 2009.

J. Gai and **R. L. Stevenson**, “Contour Tracking BASd On A Synergetic Approach of Geodesic Active Contours and Conditional Random Fields,” *Proceedings of the 17th IEEE International Conference on Image Processing*, Hong Kong, China, September, 2010.

J. Gai and **R. L. Stevenson**, “Optical Flow Estimation With p-Harmonic Regularization,” *Proceedings of the 17th IEEE International Conference on Image Processing*, Hong Kong, China, September, 2010.

Y. Li and **R. L. Stevenson**, “Affine image registration with curve mapping,” *Proceedings of the SPIE/IS&T Conference on Visual Information Processing and Communication II*, San Francisco, CA, January 2011.

J. D. Simpkins and **R. L. Stevenson**, “Robust Grid Registration for Non-Blind PSF Estimation,” *Proceedings of the SPIE/IS&T Conference on Visual Information Processing and Communication III*, San Francisco, CA, January 2012.

Y. Li and **R. L. Stevenson**, “A Similarity Metric for Multimodal Images Based on Modified Hausdorff Distance,” *Proceedings of the 9th IEEE International Conference on Advanced Video and Signal-Based Surveillance*, Beijing, China, September 2012.

J. D. Simpkins and **R. L. Stevenson**, “Mapping Measurable Qualities of Point-Spread Function Observations to Seidel Aberration Coefficients,” *Proceedings of the 18th International Conference on Image Processing*, Orlando, FL, September 2012.

Y. Li and **R. L. Stevenson**, “Multimodal Image Registration By Iteratively Searching Keypoint Correspondences,” *Proceedings of the SPIE/IS&T Conference on Visual Information Processing and Communication IV*, San Francisco, CA, February 21, 2013.

J. D. Simpkins and **R. L. Stevenson**, “A Spatially-Varying PSF Model for Seidel Aberrations and Defocus,” *Proceedings of the SPIE/IS&T Conference on Visual Information Processing and Communication IV*,

San Francisco, CA, February 21, 2013.

Y. Li and **R. L. Stevenson**, “Register multimodal images of range information,” *Proceedings of the SPIE/IS&T Conference on Visual Information Processing and Communication V*, San Francisco, CA, February 17, 2014.

J. D. Simpkins and **R. L. Stevenson**, “Register Multimodal Images of Range Information,” *Proceedings of the SPIE/IS&T Conference on Visual Information Processing and Communication V*, San Francisco, CA, February 17, 2014.

R. Zhen and **R. L. Stevenson**, “Joint Deblurring and Demosaicking of Raw Image Data With Motion Blur” *Proceedings of the SPIE/IS&T Conference on Visual Information Processing and Communication V*, San Francisco, CA, February 17, 2014.

R. Zhen and **R. L. Stevenson**, “Motion Blur Kernel Estimation Using Noisy Inertial Data,” *Proceedings of the IEEE International Conference on Image Processing*, Paris, France, pp. 4602-6, October 27, 2014.

R. Zhen and **R. L. Stevenson**, “Semi-blind Deblurring Images Captured with Electronic Rolling Shutter Mechanism,” *Proceedings of the SPIE/IS&T Conference on Visual Information Processing and Communication VI*, February 2015.

J. D. Simpkins and **R. L. Stevenson**, “Parameterized modeling and estimation of spatially varying optical blur,” *Proceedings of SPIE/IS&T Conference on Digital Photography and Mobile Imaging XI*, February 2015.

R. Zhen and **R. L. Stevenson**, “Motion debarring for depth-varying scenes,” *IS&T Conference on Visual Information Processing and Communication VII*, February 2016.

H. Jin, Y. Li, and **R. L. Stevenson**. “Register Multimodal Image of Large Scene Depth Variation with Global Information,” *IS&T Conference on Visual Information Processing and Communication VII*, February 2016.

R. Zhen and **R. L. Stevenson**, “Motion Deblurring and Depth Estimation From Multiple Images,” *Proceedings of the IEEE International*

Conference on Image Processing, Phoenix, Arizona, , September 25-29, 2016.

L. N. Kloepper, Y. Fu, M. Kinniry, **R. L. Stevenson**, C. H. Brighton, P. Domski, C. Harding, and G. K. Taylor, “Hawks, ziplines, and drones: new methods for recording echolocation of bats in large groups,” *North American Society for Bat Research*, Knoxville, TN, October 2017.

L. N. Kloepper, Y. Fu, M. Kinniry, **R. L. Stevenson**, C. H. Brighton, P. Domski, C. Harding, and G. K. Taylor, “Sensing in streams and swarms: echolocation of bats in large groups,” *XXVI International Bioacoustics Council Meeting*, Hardiwar, India, October 2017.

S. Zhang and **R. L. Stevenson**, “Intertia Sensor Aided Alignment for Burst Pipeline in Low Light Conditions,” *Proceedings of the IEEE International Conference on Image Processing*, Athens, Greece, , October 7-10, 2018.

S. Zhang and **R. L. Stevenson**, “GAN Based Image Deblurring Using Dark Channel Prior,” *IS&T Conference on Computational Imaging XVII*, January 2019.

R. Izadi, **R. L. Stevenson**, and L. Kloepper, “Segmentation of overlapping sources in mixtures of bat echolocation calls,” *178th Meeting of the Acoustical Society of America*, December 2019.

J. Li and **R. L. Stevenson**, “Indoor Layout Estimation by 2D LiDAR and Camera Fusion,” *IS&T Conference on Computational Imaging XVIII*, January 2020.

S. Zhang and **R. L. Stevenson**, “A Dataset for Deep Imaging Deblurring Aided by Inertial Sensor Data,” *IS&T Conference on Computational Imaging XVIII*, January 2020.

Patents

“Video Coding using a Maximum A Posteriori Loop Filter,” U.S. Patent 6,081,552, June 27, 2000.

Invited Talks

“Bayesian Techniques for Image Restoration,” Department of Electrical Engineering and Computer Science, Washington State University, Pull-

man, WA, March 27, 1992.

“Reconstruction and Enhancement of Image and Video Data,” Hewlett Packard Research Laboratory, Palo Alto, CA, October 12, 1993.

“Stochastic Image Modeling for Image Enhancement,” Department of Electrical Engineering and Computer Science, University of California, Berkeley, CA, February 10, 1994.

“Stochastic Image Modeling for Image Enhancement,” Department of Electrical Engineering and Computer Science, Northwestern University, IL, May 31, 1994.

“Bayesian Estimation Techniques for Image/Video Processing,” Intel Corp., Hillsboro, OR, Part I July 7, 1994, Part II July 21, 1994.

“HVS Based Image Compression,” Intel Corp., Hillsboro, OR, August 18, 1994.

“Bayesian Estimation Techniques for Image/Video Processing,” Tektronix Inc., Beaverton, OR, August 19, 1994.

“Bayesian Estimation Techniques for Image/Video Processing,” Intel Corp., Santa Clara, CA, August 23, 1994.

“Post-Processing MRV Video Data,” Intel Corp., Hillsboro, OR, August 25, 1994.

“Improved Robust Image/Video Communication,” Motorola Corp., Schaumburg, IL, February 21, 1995.

“Stochastic Modeling of Color Image Data,” Xerox Corp., Webster, NY, May 24, 1995.

“Multi-Frame Integration for Video Enhancement,” Kodak Corp., Rochester, NY, August 4, 1995.

“Bayesian Estimation Techniques for Image/Video Processing,” Ricoh California Research Center, Palo Alto, CA, February 3, 1996.

“Bayesian Estimation Techniques for Image/Video Processing,” University of Delaware, Newark, DE, October 10, 1996.

“Issues in Video Compression,” Intel Corporation, Hillsboro, OR, June 21, 1997.

“Techniques for High-Speed Image Enhancement,” Sun Microsystems, Sunnyvale, CA, May 21, 1998.

“Stochastic Modeling for Image/Video Processing,” Purdue University, West Lafayette, IN, Nov. 12, 1998.

“High Performance Multimedia Applications Reserach,” Sun Microsystems, Sunnyvale, CA, Jan. 25, 1999.

“Video over the Internet,” D. E. Shaw & Co., New York, NY, May 4, 2000.

“Entertainment Video over the Internet,” Sun Microsystems, Sunnyvale, CA, Nov. 16, 2000.

“The Creative Scientist,” Keynote address at 16th Annual Undergraduate Research Symposium, University of Delaware, Newark, DE, May 5, 2001.

“Super-Resolution Camera Systems,” Thomson Consumer Electronics, Indianapolis, IN, November 28, 2001.

“Three-Dimensional Signal Processing,” Air Force Research Laboratory, Rome, New York, September 26, 2002.

“Bayesian Image and Video Restoration,” ECE Distinguished Speaker Seminar Series at the Illinois Institute of Technology, October 24, 2003.

“Error Resilient Video Coding,” Purdue University, West Lafayette, IN, May 17, 2005.

“Robust Video Compression Using Multiple Description Coding,” Indiana University-Purdue University Indianapolis, Indianapolis, IN, November 2, 2006.

“Bayesian-Based Image and Video Enhancement,” Digimarc Corporation, Beaverton, OR, July 27, 2011.

Dissertations/Theses Supervised

Ph.D. Dissertations

R. R. Schultz, “Multichannel Stochastic Image Models: Theory, Applications, and Implementations,” Ph.D. Dissertation, University of Notre Dame, November 1994.

T. P. O’Rourke, “Robust Image Communication: An Improved Design,” Ph.D. Dissertation, University of Notre Dame, January 1996.

B. E. Schmitz, “Enhancement of Sub-Sampled Color Image Data,” Ph.D. Dissertation, University of Notre Dame, March 1996.

R. Lladós-Bernaus, “Entropy Coding Techniques for Robust Video Compression,” Ph.D. Dissertation, University of Notre Dame, March 1998.

M. A. Robertson, “High-Quality Reconstruction of Digital Image and Video from Imperfect Observations,” Ph.D. Dissertation, University of Notre Dame, April 2001.

R. Magill, “Emulating an Output Queued Packet Switch with Systems Containing Input and Output Queueing,” Ph.D. Dissertation, University of Notre Dame, May 2003.

K. Erickson, “Quality Optimization of Standards - Compliant Encoded Video,” Ph.D. Dissertation, University of Notre Dame, May 2003.

S. Borman, “Topics in Multiframe Superresolution Restoration,” Ph.D. Dissertation, University of Notre Dame, May 2004.

G. Zhang, “Robust Scalable Video Compression Using Multiple Description Coding,” Ph.D. Dissertation, University of Notre Dame, May 2007.

J. Gai, “Robust Target Tracking: Theory, Applications and Implementations,” Ph.D. Dissertation, University of Notre Dame, May 2010.

Y. Li, “Multimodal Image Registration Through Iteratively Searching Correspondences of Keypoints and Line Segments,” Ph.D. Dissertation, University of Notre Dame, December 2012.

J. Simpkins, “Modeling, Approximation, and Estimation of Spatially-Varying Blur in Photographic Systems,” Ph.D. Dissertation, University of Notre Dame, May 2016.

L. Hollmann, “Modeling, Approximation, and Estimation of Spatially-Varying Blur in Photographic Systems,” Ph.D. Dissertation, University of Notre Dame, November 2016.

R. Zhen, “Aided Blind Deblurring Image Degraded by Motion Blur,” Ph.D. Dissertation, University of Notre Dame, February 2017.

M.S.E.E. Theses

R. R. Schultz, “Improved Definition Image Expansion,” M.S.E.E. Thesis, University of Notre Dame, January 1992.

T. P. O’Rourke, “Human Visual Based Wavelet Decomposition for Image Compression,” M.S.E.E. Thesis, University of Notre Dame, December 1992.

B. E. Schmitz, “Curve Reconstruction: A Balance Between Smoothness and Discontinuity Preservation,” M.S.E.E. Thesis, University of Notre Dame, February 1993.

H. M. Zayed, “A Tunable Analog VLSI Network for Preserving Discontinuities in One-Dimensional Signals,” M.S.E.E Thesis, University of Notre Dame, November 1993 (co-adviser: G. Bernstein).

M. J. Wahoske, “Dual-Receiver Blind Identification for Image Blurs,” M.S.E.E Thesis, University of Notre Dame, August 1996 (co-adviser: R. Liu).

M. Robertson, “Computationally Efficient Post-Processing of Compressed Video Streams,” M.S.E.E Thesis, University of Notre Dame, February 1998.

G. Zhang, “Modified Fixed-Length Entropy Coding for Robust Video Compression,” M.S.E.E Thesis, University of Notre Dame, December 2002.

J. D. Simpkins, “Modeling and Estimation of Spatially-Varying Point-Spread Functions Due to Lens Aberrations and Defocus,” M.S.E.E. Thesis, University of Notre Dame, December 2011.

R. Zhen, “Enhanced Raw Image Capture and Deblurring,” M.S.E.E. Thesis, University of Notre Dame, May 2013.

Current Research Students

Shuang Zhang
Jieyu Li
Mohammad Rasool Izadi

Research Funding

Current Funding

Principal Investigator, EE Chair Fund, \$575,000 for “Video Enhancement Research.”

Prior Funding

Principal Investigator, Jesse H. Jones Faculty Research Fund, University of Notre Dame, \$9,750 for “Reliable Surface Parameter Estimation in Three-Dimensional Vision,” (with P. Flynn).

Principal Investigator, Jesse H. Jones Faculty Research Equipment Fund, University of Notre Dame, \$7,675 for “Hardware for the Acquisition and Display of Real-Time Video Signals,” (with K. Sauer).

Co-Principal Investigator, Rome Laboratory, F30602-92-C-0138, \$85,000 for “Multi-Frame Integration,” (with Y. Huang and R. Liu).

Co-Principal Investigator, National Science Foundation, CDA92-22905, \$58,126 for a “High Resolution Video Processing System,” (with D. Costello, K. Sauer, P. Bauer, Y. Huang and R. Liu).

Principal Investigator, Indiana Space Grant Consortium, \$7,300 for “Real-Time Vision for Teleoperated Control of Unmanned Vehicles and Robots,” \$7,500 for “Robust Video Coding,” \$5,889 for “Robust Video Coding,”

Principal Investigator, Apple Computer, Inc., \$15,000 for “Color Palette Restoration,” \$16,467 equipment donation.

Co-Principal Investigator, Office of University Computing, University of Notre Dame, \$20,000 for “Computing for System Engineering,” (with D. Costello and A. Lumsdaine).

Co-Principal Investigator, National Aeronautics and Space Administration, NASA-NAG 3-1549, \$50,795 for “Integrated System Design for the Transmission of Image Data over Low Bit Rate Noisy Channels,” (with D. Costello and Y. Huang).

Principal Investigator, Rome Laboratory, F30602-94-1-0017, \$35,408 for “Multi-Frame Integration for the Extraction of High Resolution

Still Images from Video Sequences.”

Principal Investigator, Rome Laboratory, F30602-94-1-0016, \$50,785 for “Parallel and Distributed Algorithms for High-Speed Image Processing,” (with A. Lumsdaine).

Principal Investigator, Intel Corp., \$68,000 for “Post-Processing Compressed Video Data,” \$15,000 equipment donation.

Co-Principal Investigator, Lockheed Martin, \$150,000 for “Robust Transmission of Images over Noisy Channels,” (with D. Costello and Y. Huang).

Principal Investigator, Apple Computer, Inc., \$19,100 for “Quicktake Image Enhancement,” \$15,000 equipment donation.

Co-Principal Investigator, Office of University Computing, University of Notre Dame, \$21,600 for “Multidisciplinary Engineering Design Laboratory,” (with J. Brockman, J. Kantor, J. Renaud, D. Kirkner, S. Batill, and P. Kogge).

Principal Investigator, Motorola Corp., \$91,252 for “Robust Transmission of Image Data over Low-Bit-Rate Noisy Channels,” (with D. Costello, R. Liu and Y. Huang).

Principal Investigator, Rome Laboratory, F30602-96-C-0235, \$199,964 for “Parallel and Distributed Algorithms for High-Speed Image Processing,” (with A. Lumsdaine).

Co-Principal Investigator, Office of University Computing, University of Notre Dame, \$23,000 for “An ATM Network for High-Speed Communications,” (with A. Lumsdaine).

Principal Investigator, Sun Microsystems, \$21,400 for “VIS-Based Image Enhancement.”

Co-Principal Investigator, IBM, \$309,544 for “Scalable Shared Memory: Case Studies,” (with A. Lumsdaine, N. Chrisochoides, J. Westerink, E. Maginn, M. Stadtherr).

Co-Principal Investigator, Army Research Office, DAAG55-98-1-0091, \$250,000 for “Scalable Meta-Computing for Computational Science and Engineering,” with A. Lumsdaine, N. Chrisochoides, J. Westerink, E.

Maginn, M. Stadtherr).

Principal Investigator, Graduate School, University of Notre Dame, \$71,980 for “High-Resolution Video Processing,”.

Principal Investigator, Department of Defense, MDA904-98-C-B224, \$124,150 for “Temporal Image Enhancement,” (with A. Lumsdaine).

Co-Principal Investigator, Graduate School, University of Notre Dame, \$215,000 for “Scalable Meta-Computing for High Performance Computational Science and Engineering,” (with A. Lumsdaine, N. Chrisochoides, J. Westerink, E. Maginn, M. Stadtherr).

Principal Investigator, Sun Microsystems, \$55,060 for “Multimedia Architectures.”

Principal Investigator, Graduate School, University of Notre Dame, \$75,000 for “Sun Microsystems Embedded Center.”

Co-Principal Investigator, Indiana’s 21st Century Research & Technology Fund, \$829,714 for “Entertainment Video over the Internet,” (with E. Delp, B. Beyers, C. Rosenberg, P. Salama, and N. Shroff).

Principal Investigator, Sun Microsystems, \$40,000 for “Entertainment Video.”

Co-Principal Investigator, National Science Foundation, \$248,887 for “Instrumentation for Multidimensional Imaging and Applications”, (P. Flynn, K. Bowyer, and D.Z. Chen).

Principal Investigator, Department of the Air Force, \$75,000 for “Multi-Source Image Correlation and Analysis,” (with P. Flynn, and K. Bowyer).

Co-Principal Investigator, Indiana’s 21st Century Research & Technology Fund, \$856,576 for “Advanced Digital Video Compression: New Techniques for Security Applications,” (with E. Delp, L. Christopher, B. Brenner, C. Armstrong, and P. Salama).

Principal Investigator, Office of Naval Research, \$39,461 for “Biologically Inspired Approaches to Overcome Mutual-Interference by Active Sensor Systems.”

Principal Investigator, Office of Naval Research, \$54,073 for “Signal Processing Methods to Isolate Individual Bat FM calls from within the noise of a swarm.”

Teaching and Course Development

EE220	Devices and Systems in Electrical Engineering Developed: Fall 1998 Taught: Fall 1998, 1999, 2000
EE224/EE20224	Introduction to Electrical Engineering Taught: Fall 1990, 1992, 1995, 1999, 2000, 2006, 2007, 2008
EE242/EE20242	Electronic Circuits Taught: Spring 2001, 2002, 2003, 2004, 2005
EE30363	Random Phenomena in Electrical Engineering Taught: Spring 2010, 2011, 2012, 2013
EE30321	Embedded Systems Developed: Spring 2016 Taught: Spring 2016, 2017, 2018, 2019, 2020
EE40354	Multimedia Signals and Systems Developed: Fall 2012 Taught: Fall 2012, 2016, 2017, 2018, 2019; Spring 2014
EE471/EE40471	Digital Signal Processing Taught: Spring 1992, 1993, 1995, 1996, 2000, 2008
EG498	Multidisciplinary Engineering Design Laboratory Developed: Fall 1995 Taught: Fall 1995
EE498	Topics in Image Processing Taught: Fall 1994
EE573/EE60573	Random Processing, Estimation and Detection Theory Taught: Spring 2007, 2009
EE581/EE60581	Digital Image Processing Taught: Spring 1991, 1994, 1999, 2006, 2015; Fall 1997, 2001, 2003, 2010
EE598/EE60671	Advanced Digital Signal Processing Developed: Fall 2004

	Taught: Fall 2004, 2005, 2011, 2013, 2014
EE598	Computer Vision Developed: Fall 1991 Taught: Fall 1991, 1993
EE663/EE80663	Advanced Stochastic Processes Developed: Spring 1998 Taught: Spring 1998, Fall 2002, 2009
ELEG631	Applications of Digital Signal Processing Developed: Fall 1996 Taught: Fall 1996, University of Delaware
CSE498P	Digital Multimedia Hub System Design Developed: Spring 2003 Taught: Spring 2003

University Services

University

Chair, Science and Technology Subcommittee of the Core Curriculum
Committee
2018–Present

Core Curriculum Committee
2018–Present

Club Supervisor, Notre Dame Machine Learning Club
2018–Present

Committee on Advising
2018–2019

Club Supervisor, Rubik’s Cube Club of Notre Dame
2011–2015

University Committee on Research and Sponsored Programs
2006–2010

Intellectual Property Committee
2003–2006

ND’s Technical Liaison to the Indiana Governor for Sun Microsystems
2000–2001

Committee on Technical Computing
1995–1996

University Committee on Computer and Information Sciences
1995–1996, 2002–2003

University Committee on Academic Technology

2003–2006
Faculty Senate
1993–1996
Freshman Orientation
1993–1995, 1998–2007

Engineering College

Ad-hoc Committee on First Year Engineering
2018–2019
Four Horsemen Venture Capital Fund Advisory Committee
2003–2004
CSE Chairman Search Committee
1999–2001
College Council
1997–2000
Undergraduate Studies Committee
1994–1996, 1998–1999, 2013–Present
College Computer Committee
1995–1996, 1997–2013
Ad hoc College Computer Committee
2001–2002, 2007
Friends of the MEP mentoring initiative
1992

Electrical Engineering Department

Ad-hoc Committee on the Curriculum
2017–Present
Director of Undergraduate Studies
2014–Present
ABET Coordinator
2016–2017
Committee on Appointments and Promotions
2007–2009, 2017–Present
Area Committee Chairman
2002–2013
Graduate Committee
1991–1994, 2003–2005, 2006–2008, 2010–2012
Undergraduate Committee
1994–1996, 1998–2000, 2001–2003, 2005–2007, 2011–Present
Undergraduate Coordinator
1994–1996, 1998–1999
Undergraduate Mentor

2006–2014
Qualifying Exam Coordinator
1991–1993
Computer Committee, Chair
1994–1996, 1997–2013
Electrical Engineering Commencement Coordinator
2002
Graduate Admissions Committee
1997–1998, 2008, 2013
Facilities Committee
1997–1998
Honesty Committee
1993–1994
Eta Kappa Nu Faculty Advisor
1991–1996

February 3, 2020

EXHIBIT B

Robert Louis Stevenson

Litigation Experience

Contact

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Buchanan, MI 49107

Tel.: +1 574-339-3514

EMail: rlstevenson@me.com

Summary of Expert Testimony (20+ years)

Deposition Testimony: 63

Jury Trial Testimony: 12

Bench Trial Testimony: 2

ITC Hearing Testimony: 13

Markman Hearing Testimony: 8

Expert Testimony (last 5 years)

Expert witness for Canon Inc. in “Canon Inc v. Intellectual Ventures II LLC.” Cases IPR2014-00631 and IPR2014-00632 before the Patent Trial and Appeal Board (deposition testimony).

Expert witness for Canon Inc. in “Intellectual Ventures II LLC. v. Canon Inc.” Case 13-CV-473 (SLR) for the District of Delaware (deposition testimony).

Expert witness for CTP Innovations, LLC in “Eastman Kodak Company, et al. v. CTP Innovations, LLC.” Case IPR2014-00790 before the Patent Trial and Appeal Board (deposition testimony).

Expert witness for Google, Inc. in “Videoshare, LLC. v. Google, Inc. et al.” Civil Action No. 13-cv-990 (GMS) in the District of Delaware (deposition testimony).

Expert witness for Canon, Inc., in “Technology Properties Limited, LLC

et al. v. Canon, Inc. et al,” Case No. 4:14-cv-03640-CW in the Northern District of California, Oakland Division (deposition testimony).

Expert witness for Advanced Silicon Technologies, LLC., in “Certain Computing or Graphics Systems, Components Thereof, and Vehicles containing samel,” ITC Investigation No. 337-TA-984 (deposition testimony).

Expert witness for Alcate-Lucent USA, Inc., in “Intellectual Ventures, et al. v. Toshiba Corporation, et al,” Case No. 1:14-cv-0764-WTL-TAB in the Southern District of Indiana Indianapolis Division (deposition testimony).

Expert witness for Nautilus Hyosung, Inc., in “Certain Automated Teller Machines, ATM Products, Components Thereof, and Products Containing the Same,” ITC Investigation No. 337-TA-972 (deposition and hearing testimony).

Expert witness for Toshiba., in “Intellectual Ventures, et al. v. Toshiba Corporation, et al,” Case No. 13-453-SLR-SRF in the District of Delaware (deposition testimony and trial testimony).

Expert witness for Samsung Electronics Co. LTD. and Microsoft Corporation in “Microsoft Corporation, et al. v. FastVDO LLC.” Case IPR2016-01179 before the Patent Trial and Appeal Board (deposition testimony).

Expert witness for Samsung., in “Image Processing Technologies, LLC v. Samsung Electronics Co., LTD, et. al” Case No. 2:16-CV-0505-JRG in the Eastern District of Texas (deposition testimony).

Expert witness for Harmonic, Inc., in “Avid Technology, Inc. v. Harmonic, Inc.,” Case No. 17-682-GMS in the District of Delaware (deposition testimony).

Expert witness for IPDEV Co., in “IPDEV Co. v. Ameranth, Inc.,” Case No. 3:14-cv-01303-DMS-WVG in the Southern District of California (deposition testimony).

Expert witness for Funai, MediaTek, MStar, Vizio, LG and Sigma., in “Certain Semiconductor Devices and Consumer Audiovisual Products

Containing the Same,” ITC Investigation No. 337-TA-1047 (deposition and trial).

Expert witness for Align Technology, Inc., in “Certain Intraoral Scanners and Related Hardware and Software,” ITC Investigation No. 337-TA-1090 (Markman hearing technology tutorial, deposition and hearing testimony).

Expert witness for Apple Inc., in “Qualcomm Inc., v. Apple Inc,” Case No. 3:17-cv-00108-GPC-MDD and 3:17-cv-00110-GPC-MDD in the Southern District of California (deposition).

Expert witness for ZiiLabs Inc. Ltd., in “Certain Graphics Processors and Products Containing the Same,” ITC Investigation No. 337-TA-1099 (Markman Hearing Technology Tutorial and deposition).

Expert witness for LG Electronics, Inc., in “Mondis Technology LTD. v. LG Electronics, Inc., et al.,” Case No. 15-cv-4431 (SRC)(CLW) in the District of New Jersey (deposition and trial).

Expert witness for Apple Inc., in “Qualcomm Inc., v. Apple Inc,” Case No. 3:17-CV-1375-DMS-MDDD in the Southern District of California (deposition).

Expert witness for Baxter Corporation Englewood in “Becton, Dickinson and Company v. Baxter Corporation Englewood,” Cases IPR2019-00120 and IPR2019-00121 before the Patent Trial and Appeal Board (deposition testimony).

Expert witness for Eagle View Technologies, Inc., in “Eagle View Technologies, Inc. et al. v. Xactware Solutions, Inc., et al.,” Case No. 1:15-cv-07025-RBK-JS in the District of New Jersey (deposition and trial).

Expert witness for Align Technology, Inc., in “Certain Dental and Orthodontic Scanners and Software,” ITC Investigation No. 337-TA-1144 (deposition and hearing testimony).

November 26, 2019